
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 128-7980
SRP Section: 18 – Human Factors Engineering
Application Section: 18.6 Treatment of Important Human Actions (TIHAs)
Date of RAI Issue: 08/05/2015

Question No. 18-13

Title 10 of the Code of Federal Regulations (10CFR) Section 52.47(a)(8) requires an applicant for a design certification to provide an FSAR which includes the information necessary to demonstrate compliance with any technically relevant portions of the Three Mile Island requirements set forth in 10 CFR 50.34(f), with certain exceptions. Section 10 CFR 50.34(f)(2)(ii) requires an applicant to "Establish a program, to begin during construction and follow into operation, for integrating and expanding current efforts to improve plant procedures. The scope of the program shall include.....human factors engineering..." The current NRC guidance for developing a human factors engineering (HFE) program is NUREG-0711, Rev 3, "Human Factors Engineering Program Review Model." The applicant stated in the FSAR, Tier 2, Chapter 18 "Human Factors Engineering," that it was working in accordance with the criteria of NUREG- 0711 in establishing its HFE program.

Section 7.4 (1), "Review Criteria," of NUREG-0711, states in part that the applicant should identify risk-important human actions from the PRA/HRA. Additionally, Section 1.2.2, "Review Elements," of NUREG-0711 states in part that the NRC staff accepts implementation plans for review when the results for an HFE element are not available for the review.

The staff reviewed KHNP DCD Section 18.6, "Treatment of Important Human Actions." DCD Section 18.6.2.a, "RIHAs," states that the list of RIHAs is developed from the analysis results of Chapter 19, which includes the Level 1 and Level 2 PRAs for internal and external events during all modes. Section 18.6.3, "Results," states that "the TIHA ReSR includes the list of IHAs and their corresponding HFE characteristics, as extracted from the PRA..."

The staff reviewed DCD Chapter 19, "Probabilistic Risk Assessment and Severe Accident Evaluation." DCD Chapter 19 lists "risk-significant operator actions" for Level 1, Level 2, and lowpower shutdown (LPSD) internal and external events, with the exception of seismic events, in Tables 19.1-24, 25, 38, 39, 55, 56, 61, 62, 72, 73, 78, 79, 104, 105, 117, 118, 130, 131, 145, 146, 159, and 160.

Provide the list of risk-important human actions (RIHAs) for staff review. Revise the application to reflect the RAI response.

Response

The risk-important human actions (RIHAs) are provided in the Attachment associated with this response.

The list will be documented in the TIHA ReSR.

Impact on DCD

There is no impact on the DCD.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical, or Environmental Report.

Table 1. Risk-Important Human Actions (RIHAs) at Power

Scenario	Action	Reference (PSA Be. Name)	Time Available (min.)	HFE Characteristics					Comment
				HSI Inventory	Staffing	Stress	Time Required (min.)	Other	

TS

Scenario	Action	Reference (PSA Be. Name)	Time Available (min.)	HFE Characteristics					Comment
				HSI Inventory	Staffing	Stress	Time Required (min.)	Other	

TS

Scenario	Action	Reference (PSA Be. Name)	Time Available (min.)	HFE Characteristics					Comment
				HSI Inventory	Staffing	Stress	Time Required (min.)	Other	

TS

Scenario	Action	Reference (PSA Be. Name)	Time Available (min.)	HFE Characteristics					Comment
				HSI Inventory	Staffing	Stress	Time Required (min.)	Other	

TS

Table 2. Risk-Important Human Actions (RIHAs) at LPSD

Scenario	Action	Reference (PSA Be. Name)	Time Available (min.)	HFE Characteristics					Comment
				HSI Inventory	Staffing	Stress	Time Required (min.)	Other	

TS

Scenario	Action	Reference (PSA Be. Name)	Time Available (min.)	HFE Characteristics					Comment
				HSI Inventory	Staffing	Stress	Time Required (min.)	Other	

TS

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Question No. 18-14

Section 7.4 (1), "Review Criteria," of NUREG-0711, states in part that the applicant should identify risk-important human actions from the PRA/HRA.

The staff reviewed KHNP DCD Section 18.6, "Treatment of Important Human Actions." DCD Section 18.6.2.a, "RIHAs," states that "for each RIHA, the PRA identifies assumptions regarding factors that lead to human performance error probability, including action location, time available to take the action, and action complexity." This section also claims that the RIHAs and associated HFE characteristics are clearly identified in the PRA documentation (DCD Chapter 19). The staff did not find associated HFE characteristics for any RIHA in DCD Chapter 19. APR1400-E-I-NR-14006-P, "Treatment of Important Human Actions Implementation Plan" (TIHA IP), Revision 0 also does not specify the location of the HFE characteristics.

Specify where the HFE characteristics for each RIHA are documented, and provide the HFE characteristics for each RIHA for staff review if the characteristics have been identified in documentation supporting the PRA. Revise the application to reflect the RAI response.

Response

Section 6 of the TIHA IP specifies that the HFE characteristics for each RIHA are documented in the TIHA ReSR.

The present HFE characteristics for each RIHA are provided in the attachment associated with the response to Question 18-13.

Impact on DCD

There is no impact on the DCD.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical, or Environmental Report.